



Instructions: See reverse

HEATING EQUIPMENT SIZING FORM

July 2002

Building Component	Description Including U-Factor or F-Factor	Heat Loss Factor (HLF = U x 46°Δt)	(1) Component Square Feet (SF) Linear Feet (LF) Cubic Feet (CF)	(2) Component Heat Loss (HLF x SF, LF or CF)
A. Window, Glass Block Sliding & Swinging Glass Door Skylight Garden Window	Single, uncertified (U = 1.200)	55.2 /SF x	SF =	Btuh
	Double, uncertified (U = 0.900)	41.4 /SF x	SF =	Btuh
	NFRC certified (U = 0.400)	18.4 /SF x	SF =	Btuh
	NFRC certified (U = 0.350)	16.1 /SF x	SF =	Btuh
	Skylight, single, uncertified (U = 1.580)	72.7 /SF x	SF =	Btuh
	Skylight, double, uncertified (U = 1.050)	48.3 /SF x	SF =	Btuh
	Garden window, single, uncertified (U = 2.600)	119.6 /SF x	SF =	Btuh
	Garden window, double, uncertified (U = 1.810)	83.3 /SF x	SF =	Btuh
	Other (U =)	/SF x	SF =	Btuh
	Other (U =)	/SF x	SF =	Btuh
B. Opaque Door	Wood, in wood frame (U = 0.460)	21.2 /SF x	SF =	Btuh
	Foam insulated, in metal frame (U = 0.370)	17.0 /SF x	SF =	Btuh
	Foam insulated, in wood frame (U = 0.160)	7.4 /SF x	SF =	Btuh
	Other (U =)	/SF x	SF =	Btuh
	Other (U =)	/SF x	SF =	Btuh
C. Roof/Ceiling Insulation (OPAQUE area only, does not include skylight area)	None (U = 0.400)	18.4 /SF x	SF =	Btuh
	R-19 (U = 0.049)	2.3 /SF x	SF =	Btuh
	R-30 (U = 0.036)	1.7 /SF x	SF =	Btuh
	R-38 (U = 0.031)	1.4 /SF x	SF =	Btuh
	R-49 (U = 0.027)	1.2 /SF x	SF =	Btuh
	R- (U =)	/SF x	SF =	Btuh
D. Wall Insulation, above and below grade (OPAQUE area only, does not include window & door area)	None (U = 0.250)	11.5 /SF x	SF =	Btuh
	R-11, wood studs (U = 0.088)	4.0 /SF x	SF =	Btuh
	R-15, wood studs (U = 0.076)	3.5 /SF x	SF =	Btuh
	R-21, wood studs (U = 0.057)	2.6 /SF x	SF =	Btuh
	R-19 + R-5 cavity, wood (U = 0.046)	2.1 /SF x	SF =	Btuh
	R-11, metal studs (U = 0.140)	6.4 /SF x	SF =	Btuh
	R-19, metal studs (U = 0.110)	5.1 /SF x	SF =	Btuh
	R-13 + R-3.8 cavity, metal (U = 0.084)	3.9 /SF x	SF =	Btuh
	R-13 + R-10 cavity, metal (U = 0.057)	2.6 /SF x	SF =	Btuh
	R- (U =)	/SF x	SF =	Btuh
E. Floor Over Unheated Space Insulation	None (U = 0.134)	6.2 /SF x	SF =	Btuh
	R-19 (U = 0.041)	1.9 /SF x	SF =	Btuh
	R-30 (U = 0.029)	1.3 /SF x	SF =	Btuh
	R- (U =)	/SF x	SF =	Btuh
F. Slab On Grade Floor Perimeter Insulation (use linear ft, NOT sq.ft.)	None (F = 0.730)	33.6 /LF x	LF =	Btuh
	R-10 (F = 0.540)	24.8 /LF x	LF =	Btuh
	R- (F =)	/LF x	LF =	Btuh
G. Basement Floor (for heated space ONLY)	None (F = 0.460)	21.2 /LF x	LF =	Btuh
	R- (F =)	/LF x	LF =	Btuh
H. Infiltration (use cubic ft, NOT sq.ft.)	Pre-1980 (.018 x 1.2 ACH)	1.0 /CF x	CF =	Btuh
	Post-1980 (.018 x 0.6 ACH)	0.5 /CF x	CF =	Btuh

(4) DHL/SF: DHL divided by(Heated floor area in SF) = Btuh/SF or Watts/SF
(Typical values for DHL/SF for new construction are 10 Btuh/SF or 3 Watts/SF.)

(3) Total = Design Heating Load (DHL) in Btuh = Btuh
If electric, divide by 3.413 for DHL in watts = Watts

(5) Space Heating Equipment Sizing Limits

Minimum required size = DHL x 1.0 = Btuh or Watts
Maximum allowed size = DHL x 2.0 = Btuh or Watts

(6) Proposed Space Heating Equipment

Manufacturer: Model #:
Heating output: Btuh Efficiency AFUE
 Watts HSPF

(For gas- and oil-fired equipment, output may exceed 200% of DHL **provided** that it has an AFUE of not less than 90%.)

INSTRUCTIONS FOR HEATING EQUIPMENT SIZING FORM (July 2002)

Building Code Section 310.11 establishes a minimum required heating output, Energy Code Section 503.2.2 specifies a maximum allowed output.

General Information:

This form is recommended for sizing the heating systems for all residential buildings. It may be used for commercial buildings where appropriate. This form, or acceptable alternate calculations, must be completed for each dwelling unit. A separate copy shall be attached to each set of drawings submitted with the building permit application and over-the-counter (OTC) permit application. If you have any questions, please call the City of Seattle, Department of Design, Construction and Land Use at 206-684-7846 between 1:00 and 4:15 p.m.

If new or enlarged electric service is to be installed in an existing building, you may be subject to additional Seattle City Light requirements. For further information, contact Seattle City Light at 206-615-0600 if the project is north of Denny Way or 206-386-4200 if the project is south of Denny Way.

Detailed Instructions (step numbers match the numbers shown on the front of the form):

- For existing buildings, complete for each dwelling unit as proposed after remodeling. If space heating equipment is simply being replaced, complete for the dwelling unit as existing.
- For new construction, complete for each dwelling unit as proposed.

(1) On the line with the appropriate description:

- For components A-E, enter the square footage for windows, skylights, sliding glass doors, opaque doors, opaque roof/ceiling (minus skylights), opaque wall (minus windows and doors), floor over unheated space.
- For component F, enter the linear feet of perimeter for slab-on-grade floor (less than two feet below grade), not the square footage area of the slab.
- For component G, enter the linear feet of perimeter for basement floor (more than two feet below grade). Do not enter if the basement is unheated.
- For component H, enter the volume in cubic feet of the interior heated space based on when the dwelling unit or portion thereof was or will be built.

For glazing and doors, where U-factors different from those specified are used, enter those U-factors in the blanks provided for that category. For other components, where R-values different from those specified are used, enter that value and the corresponding U-factor or F-factor in the blanks provided in that category. For all new entries, multiply the U-factor or F-factor by the 46°F. design temperature difference (70°F. - 24°F.) to obtain the corresponding heat loss factor and enter that value in the Heat Loss Factor column.

(2) Multiply the heat loss factor by component square feet (sq.ft), linear feet (lin.ft.) or cubic feet (cu.ft), as appropriate to obtain the component heat loss.

[Automated in the electronic version of this form.]

(3) Add all entries to obtain the total which is the Design Heating Load (DHL). ***[Automated in the electronic version of this form.]***

(4) Enter the heated floor area of the dwelling unit, then divide the DHL by the heated floor area to obtain the load on a square foot basis.

(Note that typical values for new construction are 10 Btuh/SF or 3 Watts/SF.)

(5) To determine the allowable heating equipment output range:

- Multiply Design Heating Load (in either Btuh or Watts) by 1.0 to obtain minimum size required by the Building Code (Section 310.11)
- Multiply Design Heating Load (in either Btuh or Watts) by 2.0 to obtain maximum allowed by the Energy Code (Section 503.2.2)

(Note that, for commercial buildings, there are no minimum Building Code requirements and the maximum Energy Code allowance is 125% of the DHL.)

[Automated in the electronic version of this form.]

(6) Enter proposed equipment size (output) and efficiency. The proposed equipment output must be within the minimum and maximum allowed.

Note that Energy Code Section 503.2.2, Exception 2, provides exceptions for natural gas- and oil-fired space heating equipment whose total rated space heating output in any one dwelling unit:

- is 40,000 Btuh or less, or
- has an annual fuel utilization efficiency (AFUE) of not less than 90 percent.

The implication is that many furnaces will need to be 40,000 Btuh or less or have an AFUE of not less than 90 percent.

(Note that there are no exceptions from the 200% sizing limit for any other systems, such as electric resistance and heat pumps.)